

### **REMARKS**

Claims 2-8, 10-14, and 16-23 are now in the application. By this Amendment, claim 22 has been amended. Support for the amendment to claim 22 is found at least at original claim 22. Claim 23 has been added. Support for claim 23 is found at least at page 5, lines 19-22, of the specification. No new matter has been added

Claims 2-8, 10-14, and 16-22 are rejected under 35 USC §103(a) as being unpatentable over the article in Eur. J. Org. Chem. 2001, 3871-3877 to Jackstell et al. in view of WO02/083695 to Ahlers et al., as evidenced by its counterpart US Patent No. 7,173,138, US Patent No. 5,731,472 to Leung et al., US Patent No. 4,567,306 to Dennis et al., US Patent No. 4,260,828 to Morrell et al., US Patent No. 4,283,562 to Billig et al., the article "Rhodium Catalyzed Hydroformylation" in chapter 9 of volume 22 of "Catalysis by Metal Complexes" to van Leeuwen, the article in J. Am. Chem. Soc. 1995, 117, 7696-7710, to Trzeciak et al., and the article in Tetrahedron Lett. 1997, 38(42), 7337-7340, to Xu et al.

Amended claim 22 recites, among other features, recirculating the catalytically active fluid to the reaction zone. At least these features of independent claim 22 and dependent claim 2 cannot reasonably be considered to be suggested by the applied citations.

The Office Action does not explicitly state which features are considered to correspond to the above-quoted features of independent claim 22. However, Applicants respectfully submit that Ahlers teaches away from the combination of features recited in claim 22.

Specifically, Ahlers teaches, at col. 38, lines 35-39, that the hydroformylation catalyst can generally be reused for the hydroformylation. However, Ahlers teaches that in these instances the catalyst is separated from the product mixtures. Ahlers fails to teach that the catalyst is reused while being dissolved in the product mixture or a fraction thereof. In particular, Ahlers teaches, at col. 38, lines 42-44, that the product-enriched fraction is obtained by fractionation after the catalyst system has been separated off. Therefore, Ahlers also fails to teach features that can reasonably be considered to correspond to at least one high-boiling soluble base remains in the catalytically active fluid after the fractionation, as recited in instant claim 7.

Claim 23 recites that the recirculating of the catalytically active fluid is carried out in the absence of carbon monoxide and hydrogen. As noted at page 5, lines 17-19, the stabilization of the hydroformulation catalysts based on phosphoramidite ligands is successful even in the absence of synthesis gas. Applicants respectfully submit that a skilled artisan would not have expected that a stabilization would be successful in the absence of synthesis gas because Leung teaches, at col. 29, lines 22-26, that the organopolyphosphite promoted rhodium catalysts suggested therein deactivate at an accelerated pace under harsh conditions, such as high temperature and low carbon monoxide partial pressure.

Independent claim 13 recites, among other features, bringing the fluid into contact with at least one base selected from trialkyl amines, dialkylaryl amines, alkyl diaryl amines, triaryl amines, and bases immobilized on a solid phase, or a combination thereof. Similar subject matter is recited in independent claims 21 and 22. At least these features can also not reasonably be considered to be suggested by the applied citations.

Applicants previously discussed in great detail the unexpected results that have been achieved with the claimed subject matter. The Office Action states, at page 5, lines 12-13, that Applicants unexpected results are not dispositive in the obviousness analysis. The Office Action does not articulate why this may be the case. Instead, the Office Action asserts that hydroformylation “is an old process” and that the skill level in the art is high. Yet, despite the long history of hydroformylation reactions and that high degree of sophistication of those conducting research therein before, the instantly claimed subject matter is, as acknowledged by the Office Action, novel, and provides a dramatic increase in stability of the catalyst.

As set forth in MPEP 716.02 (a) II, the superiority of a property shared with the prior art is evidence of nonobviousness. In particular, “[e]vidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut prima facie obviousness. ‘Evidence that a compound is unexpectedly superior in one of a spectrum of common properties . . . can be enough to rebut a prima facie case of obviousness.’”

Thus, the Office Action failed to assess the persuasiveness of Applicants' presentation of unexpected results. As such, the Office Action failed to answer all asserted advantages, as set forth in MPEP 707.07(f).

In particular, this failure to answer the substance of Applicants' arguments renders the Office Action incomplete as to all matters, as is required by 37 C.F.R. § 1.104(b). Further, MPEP § 707.07(f) states that "[i]n order to provide a complete application file history and to enhance the clarity of the prosecution history record, an examiner must provide clear explanations of all actions taken by the examiner during prosecution of an application". "Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it." "The examiner must address all arguments which have not already been responded to in the statement of the rejection" (MPEP § 707.07(f), Examiner Note 1).

The Office Action states that it is known to employ catalysts with phosphoramidite ligands for hydroformylation processes, as described by Jackstell or Ahlers. Incidentally, Jackstell mentions at page 3871, right column, second paragraph that because of the limited stability of known sterically hindered chelating phosphites there is interest in new hydroformylation catalysts. This does of course only mean that the new ligands should be stable and not that there is a demand for new additives to improve the stability of such ligands. The main concern of Jackstell is the regioselectivity of the ligands and not a method to improve their stability. Thus, a person of ordinary skill in the art would not rely on Jackstell or Ahlers as a starting point to provide a new method to improve the stability of phosphoramidite ligands.

Leurig suggests the stabilization of organopolymphosphite ligand complex catalysts, which can be employed in a hydroformylation with heterocyclic nitrogen compounds. Phosphoramidite ligands and phosphite ligands are structurally different and it was not obvious for a person skilled in the art to employ the nitrogen compounds of claim 21 of the above-identified patent application for the stabilization of phosphoramidite ligands. Moreover, as taught at page 5, lines 9-19, of Applicants' disclosure, it is surprising that those catalysts can be stabilized with bases against degradation of the ligands or deactivation of the catalysts as the ligands themselves already contain more or less basic nitrogen-containing groups. This could not have been expected in view of the teaching of Leung, as the phosphite ligands disclosed in this document

do not contain any basic groups and the employed heterocycles are also different from the bases used according to the instant claims.

Dennis suggests a hydroformylation process with a catalyst on the basis of known cyclic phosphite ligands that are already mentioned in Jackstell as having limited stability. However, there is no incentive for the skilled artisan employ tertiary amines in the method of Dennis to stabilize phosphoramidite ligands.

Moreover, Dennis suggests the stabilization of a ligand that is known for its limited stability and which is structurally far remote from the phosphoramidite ligands according to claim 21.

What is more, Dennis, suggests, at col. 4, lines 52-54, that base plays no further role in halogen ligand containing catalysts once the base has caused an inhibition period to disappear. Thus, a skilled artisan learns from Dennis that going to a different catalyst system does not necessarily retain the benefits of employing triethylamine with phosphite ligands.

Further, the Office Action applies Leung for suggesting the use of base as a means to stabilize hydroformylation catalysts. Leung suggests free heterocyclic nitrogen compounds, such as the illustrative diazole compounds at col. 30, lines 18-40. However, claim 21 recites trialkyl amines, dialkyl aryl amines, alkyl diaryl amines, triaryl amines, and bases immobilized on a solid phase, but does not recite free heterocyclic nitrogen compounds. Moreover, Leung suggests phosphite ligands, but fails to suggest phosphoramidite compounds.

With regard to independent claim 22, the Office Action asserts that the PTBD solid phases suggested in Xu can reasonably be considered to correspond to a base immobilized on a solid phase. Xu suggests using polymer supported base for deprotonation of phenols and as scavengers for trapping unreacted excess starting phenol. Thus, Xu cannot reasonably be considered to be analogous art nor to be pertinent to the instant subject matter.

The applied citations to Moloy and Treciak are relied on for suggesting that Jackstell was not the first to prepare 1-pyrrolylphosphorus ligands nor the first to use such ligands for catalytic hydroformylation reactions. Billig is relied on for suggesting that it was known in the art to stabilize hydroformylation catalysts. Moloy, Treciak, and Billig are not applied in a manner to cure the deficiencies of Jackstell, Ahlers, Dennis, and Leung discussed above.

Claims 2-8, 10-12, 14, 16-20, and 23 are in condition for allowance for their respective dependence on allowable claims 13, 21, and 22, as well as for the separately patentable subject matter that each of these claims recites.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 13111-00038-US1 from which the undersigned is authorized to draw.

Dated: May 20, 2011

Respectfully submitted,

Electronic signature: /Georg M. Hasselmann/  
Georg M. Hasselmann  
Registration No.: 62,324  
CONNOLLY BOVE LODGE & HUTZ LLP  
1875 Eye Street, NW  
Suite 1100  
Washington, DC 20006  
(202) 331-7111  
(202) 293-6229 (Fax)  
Attorney for Applicant